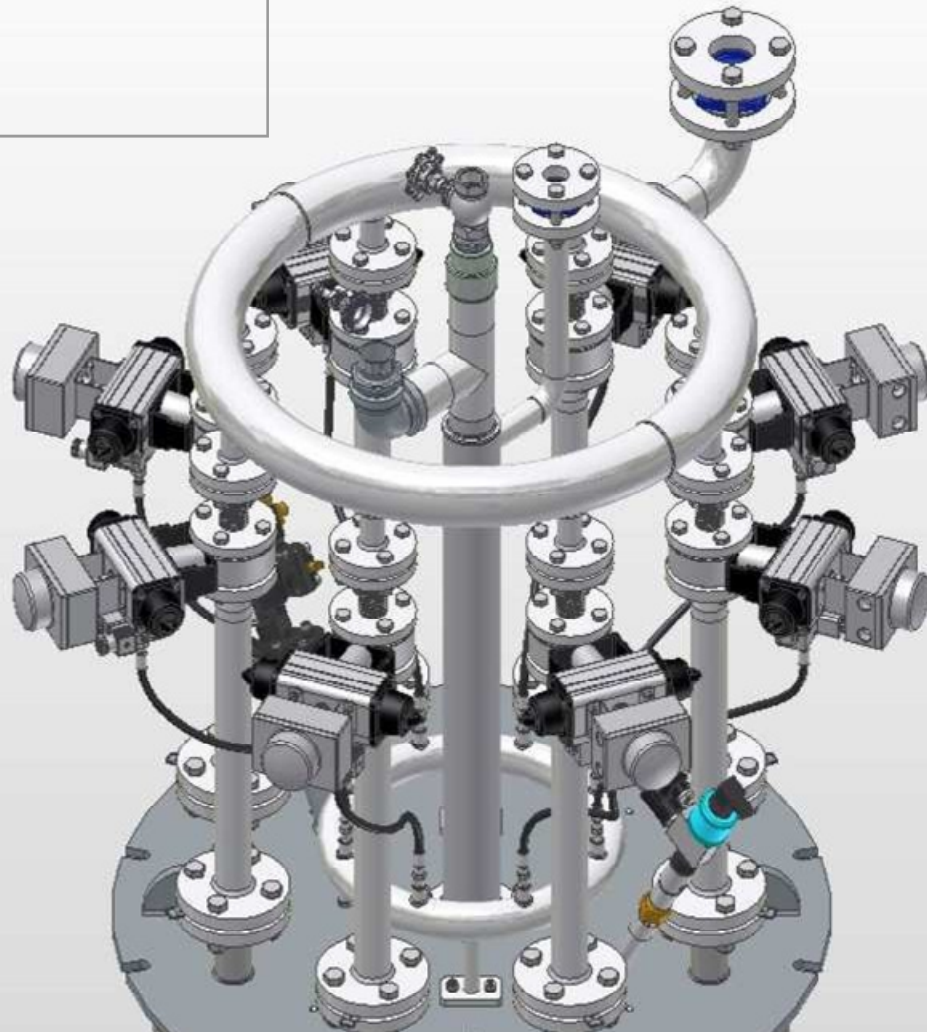


Burners



Oxygen-fuel burners
with rotating flame

TF-(E3730rev.00-15/07/2019)

GENERAL WARNINGS



- All installation, maintenance, ignition and setting must be performed by qualified staff, respecting the norms present at the time and place of the installation.
- To avoid damage to people and things, it is essential to observe all the points indicated in this handbook. The reported indications do not exonerate the Client/User from observing general or specific laws concerning accidents and environmental safeguarding.
 - The operator must wear proper DPI clothing (shoes, helmets...) and respect the general safety, prevention and precaution norms.
 - To avoid the risks of burns or high voltage electrocution, the operator must avoid all contact with the burner and its control devices during the ignition phase and while it is running at high temperatures.
 - All ordinary and extraordinary maintenance must be performed when the system is stopped.
 - To assure correct and safe use of the combustion plant, it is of extreme importance that the contents of this document be brought to the attention of and be meticulously observed by all personnel in charge of controlling and working the devices.
 - The functioning of a combustion plant can be dangerous and cause injuries to persons or damage to equipment. Every burner must be provided with certified combustion safety and supervision devices.
 - The burner must be installed correctly to prevent any type of accidental/undesired heat transmission from the flame to the operator or the equipment.
 - The performances indicated in this technical document regarding the range of products are a result of experimental tests carried out at ESA-PYRONICS. The tests have been performed using ignition systems, flame detectors and supervisors developed by ESA-PYRONICS. The respect of the above mentioned functioning conditions cannot be guaranteed if equipment, which is not present in the ESA-PYRONICS catalogue, is used.

LOGISTICS AND DISPOSAL

Transport: Protect the equipment from shocks, bumps, vibrations or temperature changes. When receiving the product, check labeling and promptly report any transport damage.

Storage: Store the product in an area protected from atmospheric agents.

Packaging: The packaging material must be disposed of according to local regulations



Disposal: To dispose of the product, follow the relevant local legislation.

CERTIFICAZIONI



- ESA PYRONICS operates with a Quality System certified by DNV GL in compliance with the **UNI EN ISO 9001** standard.
- ESA PYRONICS operates following the Code of Ethics and Behavior pursuant to Legislative Decree 231/01.
- All ESA PYRONICS products are designed, manufactured and checked following the applicable requirements described in **the UNI EN 746-2: 2010** "Industrial thermal process equipment - Part 2: Safety requirements for combustion and for fuel handling and treatment" harmonized with the Machinery Directive **2006/42 / EC**.
- According to Annex II nr.1B of the Machinery Directive 2006/42 / EC, the servomotor is considered a quasi-machine. The declaration of incorporation is available.
- The products comply with the Eurasian **EAC** market (Russia, Belarus and Kazakhstan).

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The TF series oxygen-fuel burners are designed for the generation of a rotating and high temperature flame thanks to the close mixing of pure oxygen (90% -99.9% degree of technical purity) and gas at the burner mouth. The rotation of the flame prevents the formation of hot spots in the chamber and on the material to be heated.

APPLICATIONS

- Metal melting furnaces.
- Melting furnaces for glass.
- Melting furnaces for ceramic frits.
- Heating stations.
- Holding/temperature maintenance furnaces.

CHARACTERISTICS

GENERAL:

- Capacity: from 1000kW to 5000kW
- Operation with fuel gas: CH₄
- Maximum oven temperature: 1750 °C
- Burner inlet O₂ pressure: min 100 mbar
- Burner inlet fuel gas pressure: min 100 mbar
- Flow rate: 1: 8
- Inlet oxygen and gas temperature: environment
- Low CO content in stoichiometric ratio conditions
- Low NO_x content in stoichiometric ratio conditions
- NO_x content depending on the purity of O₂ (min.90%), process temperature and ratio stoichiometric regulation

MATERIAL COMPOSITION

- Burner metal body: AISI310
- Burner refractory block: Ersol50
- Metal body surface treatment: O₂ degreasing



CAPACITY AND FLAME LENGTH

The flame length of this series of burners refers to the typically inclined flame. This is a factor to consider for the correct positioning of the burner inside the chamber.

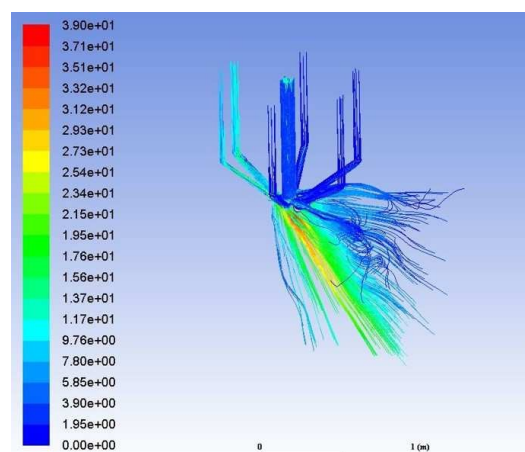
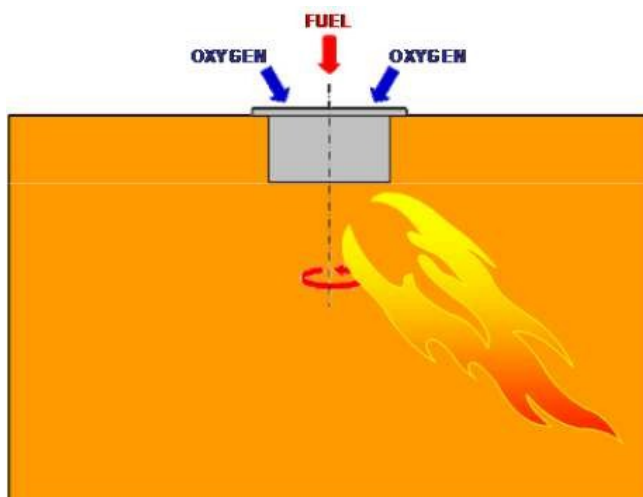
Model	Capacity [Kw]	Flame inclination	Ignition	Detection
TF-7	800	30°-45°	P86PBCW	UV-2
TF-8	1200	30°-45°	P86PBCW	UV-2
TF-9	1800	30°-45°	P86PBCW	UV-2
TF-10	2400	30°-45°	P86PBCW	UV-2
TF-11	3200	30°-45°	P86PBCW	UV-2

DESCRIPTION

The TF series burners are gas-oxygen burners with rotating flame, typically used in melting or heating furnaces. The continuous rotation of the flame around the burner axis allows installing high thermal potential without having hot spots on the bed of material. In this way there is better distribution of heat and more homogeneity of temperature inside the chamber.

The particular design of the burner, which foresees more combustion agent and fuel lances which are activated selectively according to the potential required in each moment by the process, allows to obtain a wide flow ratio (up to 8: 1), a range that cannot be covered with traditional oxygen burners. The AISI310 lances are immersed in a refractory block that protects them and makes the burner suitable for applications up to 1750 ° C, and have an inclination such as to obtain a flame deflection up to 45 ° compared with the burner axis. The speed of rotation of the flame can be adjusted via software.

The burner is ignited by an air / gas pilot burner, while the flame detection is ensured by a UV photocell.



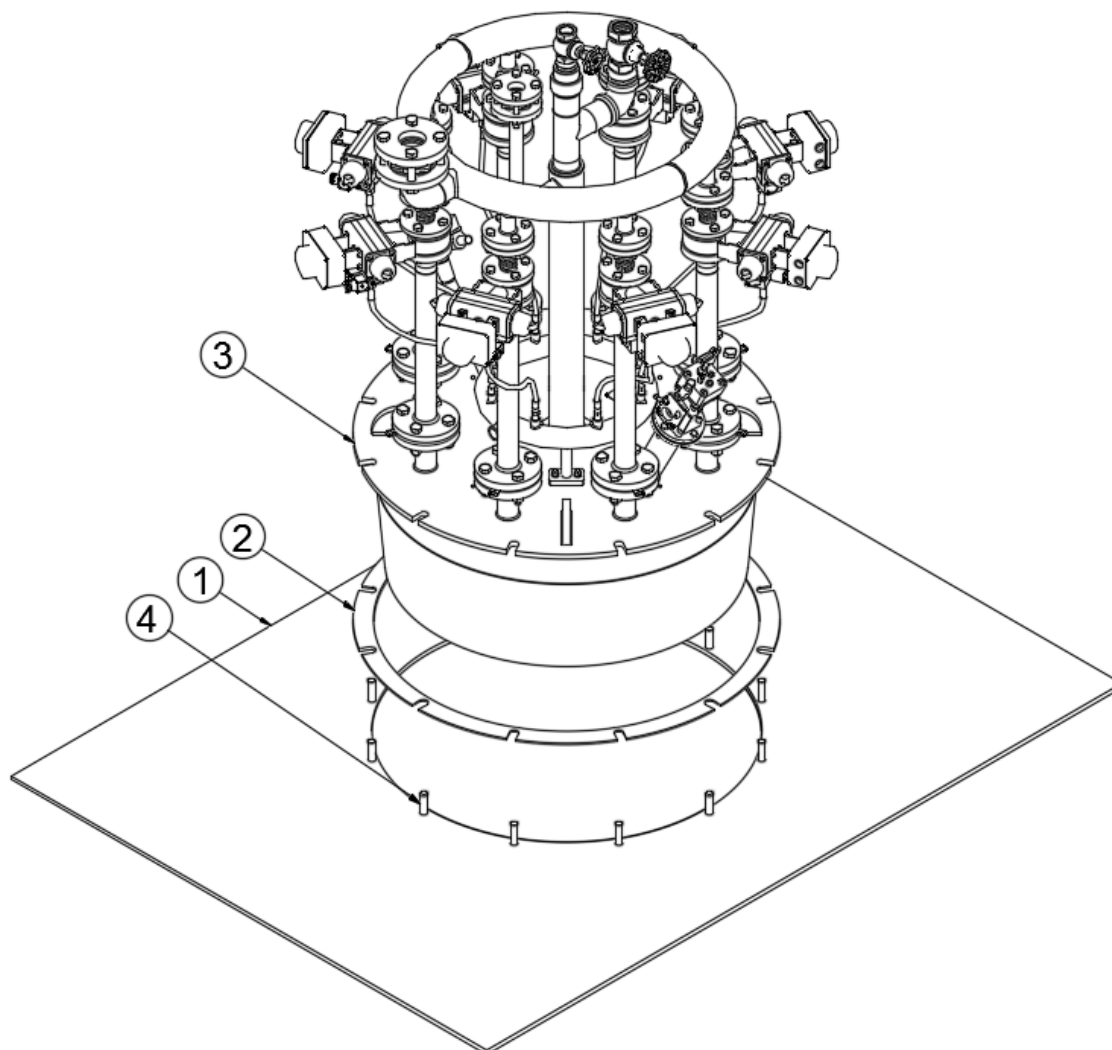
INSTALLATION

The ESA TF burners are generally roof top mounted, however in case of special needs it is also possible to fix them to the wall.

The light made for housing the burner block must have a free space around it that must then be filled with a fiber-ceramic mat.

For installation, follow the instructions carefully:

- 1 - insert the burner body gasket (**pos.02**) on the furnace wall (**pos.01**)
- 2 - lift the burner (**pos.03**) and fix it to the stud bolts (**pos.04**), checking that the gasket (**pos.02**) has not moved or deformed.
- 3 - tighten the fixing bolts.
- 4 - connect the oxygen and gas lines to the burner



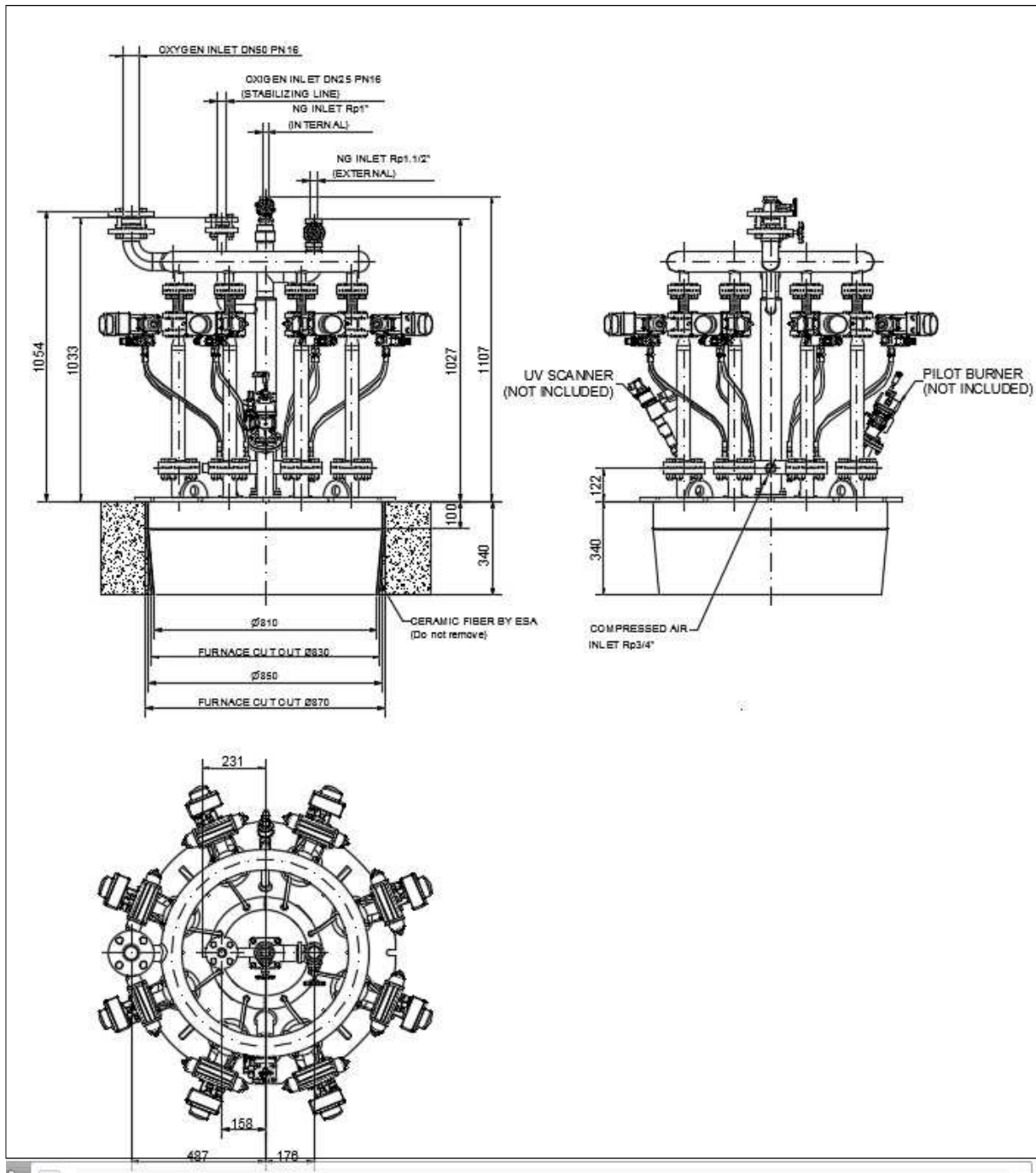
START-UP AND CALIBRATION

The operations indicated in the following chapter must be performed by expert technicians or qualified personnel. Failure to comply with the instructions may generate hazardous conditions.

- 1** - Check that the oxygen and fuel gas supply pressures are within the allowed range or in any case expected in the design phase.
- 2** - Adjust the working and intervention pressures of the combustion system safety devices, whether they are single for burner or general for the combustion system, such as: gas pressure reducer, shut-off valve, overflow valve, pressure switches, etc. Simulate the intervention of all safety devices, including the intervention of the safety overheating, verifying that the fuel shut-off devices act correctly.
- 3** - Activate the pilot burner control device and make a few attempts to ignite the pilot burner (*) until it lights up. During the ignition attempts, act on the gas regulation valve and, starting from the totally closed position, open it gradually until the main burner ignites.
- 4** - Carryout the ignition of the main burner at minimum power, without activating the flame rotation.
- 5** - Activate the side oxygen lances, starting at the minimum power of the burners, with excursions to the maximum, to check the reliability and flame stability during adjustment.

(*) For the pilot burner ignition and calibration operations, see the data sheet E3280

OVERALL DIMENSIONS - TF-10



WARNINGS

- The ESA TF series burners are intended to be used for fixed installations.
- The ignition of the burners must always be carried out at minimum power, to then modulate towards the maximum, facilitating ignitions and reducing outlet overpressures.
- For all low temperature applications (up to 750 ° C), burner ignition and fuel gas solenoid valve control must be performed using a certified burner control device.
- Check the correct connection of the power supply lines after installation. Before switching on the burner, check that the oxygen pressure, air and fuel gas values are correct.
- The burner can operate in a different power range than the one indicated in this documentation, as long as suggested by ESA-PYRONICS. depending on the application and the known operating pressure conditions. Operation with excessive power can compromise the performance and life span of the burner. In this case, the general warranty conditions automatically expire and ESA-PYRONICS is not responsible for any damage to things or persons.
- If there is any disturbance to other equipment during the burner start-up phase, use the anti-interference filter connector to connect the HV (High Voltage) cable to the ignition electrode.
- Avoid carrying out close burner ignitions in order not to overheat the ignition system control devices (solenoid valves and transformers). Consider a minimum time between one ignition and the next equal to the sum of the prepurging time and the first safety time, increased by at least 5 seconds (however, do not attempt more than 2 ignitions in a time frame of 30 seconds).
- Operate on the burner and on the devices connected only in the absence of supply voltage. In the event of a malfunction, follow the instructions in this manual in the Maintenance chapter, or contact the ESA-PYRONICS assistance.

Any modification or repair performed by third parties can compromise the safety of the application and automatically invalidates the general warranty conditions

GENERAL MAINTENANCE PLAN

Operation	Type	Suggetset frequency	Notes
Electrode high voltage connector pilot burner	O	Annual	Check the integrity of the external plastic and oxidation of the internal connector and of the electrode terminal.
Pilot burner ignition electrode	O	Annual	replace if the kanthal terminal is worn.
Integrity of refractory block	E	Annual	check from the inside for any cracks in the refractory at each furnace stop for maintenance.
Photocell glass cleaning	O	Six-monthly	reduce to quarterly intervals in a dusty environment.
Photocell replacement	O	10000 h. of operation	However every 2 years
Replacement of oxygen and gas gaskets (*)	E	Annual	See note
Burner setting	O	Annual	repeat all the steps in the "START-UP AND SETTING" section on page 06

NOTES:

Key: O = ordinary / E = extraordinary

(*) it is advisable to replace the gaskets after each disassembly operation of the oxygen and gas supply lines and to use high temperature gaskets.

ORDERING CODE

TF		
	01	02

Model:		01
TF-7	7	
TF-8	8	
TF-11	11	
... (see capacity table)	...	

Fuel type		02
Natural gas	CH4	
LPG	LPG	